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Chemists Group Hal Vinyl Chloride Safety Report as Doubts Arise

By a WALL STREET JOURNAL *Staff Reporter*

WASHINGTON—The Manufacturing Chemists Association, or MCA, has stopped circulating a safety publication dealing with vinyl chloride following reports the chemical may possibly be associated with four fatal cases of a rare form of liver cancer among workers who handled the material.

The action by the industry trade group resulted from an announcement last month by B. F. Goodrich Co. that it was investigating the cancer deaths of three workers at its Louisville, Ky., polyvinyl-chloride plant. A spokesman said yesterday the company had confirmed a fourth worker at the plant had also died of the same form of liver cancer.

The association had revised its vinyl-chloride safety publication in 1972 following reports by an Italian researcher that rats exposed to very large doses of vinyl-chloride vapors had developed malignant tumors of a kind that isn't found in man. At that time, the MCA report said that such an effect hadn't been observed in humans.

The association said it would issue a revised safety report on vinyl chloride after the question raised by the B. F. Goodrich finding is resolved.

Meanwhile, an MCA-sponsored task force on vinyl chloride, consisting of 19 companies that make the chemical, are continuing to study health records of vinyl-chloride workers through the industry. Animal studies are also being conducted. The task force began its work following the Italian report but has accelerated its study since Goodrich raised suspicions about the chemical, a spokesman for one of the companies said.

A Goodrich spokesman said the MCA task-force study on worker health records might be ready for presentation to the association "by the end of the month." The animal studies, he said, would take longer.

Almost all the vinyl chloride produced in the U.S. is used to make polyvinyl chloride, a plastic used in myriad products. Some five billion pounds of polyvinyl chloride, also known as PVC, were produced last year. B. F. Goodrich is the largest maker, accounting for an estimated 18% of U.S. production.

The Labor Department will hold hearings beginning next Monday to examine the extent of worker exposure to vinyl chloride and to explore whether federal exposure standards should be tightened.

A spokesman for the MCA, whose 174 U.S. member companies account for 97% of vinyl-chloride production, said an attempt wouldn't be made to recall the vinyl-chloride safety publication but that medical representatives of all member companies and "various technical committees" have been alerted to the possible link between the chemical and human cancer.

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Dr. Knapp

Health Hazards

Vinyl-Chloride Scare Points Up Dangers Of Other Chemicals

Substances Long Believed Safe Now Are Regarded With Greater Skepticism

A Hospital's Hidden Perils

By BARRY KRAMER
Staff Reporter of THE WALL STREET JOURNAL

It's a simple molecule: two atoms of carbon, three atoms of hydrogen and a single atom of chlorine. At room temperature it is a gas. The molecule is called chloroethylene by chemists, but it is more commonly known as vinyl chloride.

The chemical structure of vinyl chloride has been known since the 1830s. Since a decade after the Civil War, scientists have known how to link, or polymerize, the vinyl-chloride molecules like beads on a chain to form a plastic called polyvinyl chloride, or PVC. Since the late 1930s, when B.F. Goodrich perfected a commercial process for polymerizing vinyl chloride, the plastic has come to be a staple in thousands of household products ranging from kitchen food wraps to construction materials.

Last January, the world learned something else about vinyl chloride: It can cause cancer in humans. Twenty-six cases of a rare liver cancer have been discovered among workers in polyvinyl-chloride plants. All of the workers were exposed over many years to large quantities of vinyl-chloride gas. In recent months, further evidence has come to light indicating that the gas is also responsible for an increase of other cancers among the workers in the PVC plants. As a result, there now are standards regulating vinyl-chloride emissions in factories. Vinyl-chloride gas has also been banned for use as an aerosol propellant, and the Food and Drug Administration is toughening restriction of the amount of vinyl-chloride in PVC food wraps.

This is the second of two stories concerning implications of the discovery that vinyl chloride can cause cancer.

Vinyl chloride, of course, is far from the only man-made chemical known to cause cancer or, for that matter, other human ailments. Industry regularly works with toxic substances of all types known to cause ill effects ranging from skin disorders to damaged lungs, kidneys and livers. In fact, the findings about vinyl chloride point up the potential dangers of an entire group of similar chemicals, which, like vinyl chloride, contain hydrogen, carbon and chlorine. The chlorinated hydrocarbons, as the chemicals are collectively called, are used in a broad range of products to which every human being has multiple exposures.

It would be difficult to find a person anywhere who hasn't come into contact with products such as plastics, anesthetics, insecticides and herbicides, solvents and pharmaceuticals, all of which can be made from chlorinated hydrocarbons. As a result of their widespread manufacture and use, molecules from these products can be found everywhere on earth and in the upper atmosphere. Such molecules are also commonly found in human tissues.

What is particularly concerning some scientists is the fact that the compounds are rarely found in natural systems unless those systems have been exposed to man-made pollution. "Although all living things contain considerable amounts of chloride ion ... very few chlorinated organic compounds actually occur in living things," says Dr. Barry Commoner, director of the Center for the Biology of Natural Systems at Washington University in St. Louis.

Trial and Error

Dr. Commoner further notes that biologic evolution is a process of trial and error over millions of years; therefore, he says, the assumption can be made that since the chlorinated hydrocarbons are virtually absent from all living things, the compounds are likely to be "evolutionary rejects." And that means, he says, that if such compounds invade a natural system like that of man, they are likely to be toxic.

"This means that industrial operations that synthesize or make use of such substances, and agricultural and other operations that disseminate them into the environment, ought to be governed by the level of prudence that is demanded by the inherently dangerous situation," Dr. Commoner says. "That we now are discovering, with increasing frequency, health hazards due to dissemination of synthetic organic substances, both in the workplace and the general environment, is evidence that we have thus far failed to appreciate the need for such care."

It is interesting to consider that vinyl chloride, in the early days following its discovery, was actively considered as an anesthetic for surgery. But animal tests showed that the gas caused heart irritation, and it was abandoned for that use in favor of other substances. However, many anesthetics in use today are chemically related to vinyl chloride—and there is growing evidence that they aren't without harmful side effects.

For the past several years, for example, there have been scattered reports of ill effects suffered by those who administer anesthesia and among others continually exposed to anesthetic gases while working in hospital operating rooms. It has also been known for some time that there is greater-than-expected incidences of spontaneous abortion among female anesthesiologists and nurse-anesthetists and, more tellingly, a greater than expected rate of certain types of fatal cancer among anesthesiologists of both sexes. (There is no evidence that such anesthetics pose long-term dangers to surgical patients.)

Birth Defects

One recent survey of nurse-anesthetists in Michigan showed that of those who worked in the operating room during pregnancy, more than 16% delivered infants with birth defects, compared with a birth-defect rate of under 6% among nurse-anesthetists who stopped working during their pregnancy. Other surveys have found higher-than-expected rates of miscarriage and stillbirths among the wives of anesthesiologists, even though these wives presumably didn't enter an operating room until the time of their deliveries. One explanation advanced by observers is that the anesthesiologists somehow carried home sufficient amounts of anesthetic gas in their breath or on their clothes to affect their spouses.

Studies are currently under way to determine whether or not the wives of vinyl-chloride workers have been affected by minute amounts of the gas unwittingly carried home by their husbands from the plants. Of particular interest is the rate of stillbirths and miscarriages among these women. The studies are by no means simple, since the true rate of fetal wastage throughout the nation isn't exactly known and therefore a basis of comparison is difficult. Furthermore, the women's husbands are also ordinarily exposed to a wide variety of chemicals other than vinyl chlorides, hampering direct correlations.

There are, of course, other carcinogens, or cancer-causing agents, and toxic chemicals in widespread industry use that are even more dangerous than vinyl chloride. Before the Labor Department began setting standards for vinyl-chloride emissions in factories—by an emergency decree in May and then by a "permanent" standard effective next Jan. 1—it had issued standards last January for 14 other carcinogens.

The implications of all these studies and standards are clear: Industry will no longer be able to assume blithely that untested chemicals in the work environment are safe simply because they've never demonstrated any overt harm. Like vinyl chloride, which took years to take its toll on worker health, many chemicals thought to be harmless may be equally insidious. This may well mean that there will have to be extensive animal testing of new chemicals before they are introduced and that workers' health will have to be continually monitored to detect clusters of disease.

The task of such testing and monitoring would be mammoth indeed. There are currently 25,000 industrial chemicals. More than 500 new ones are introduced every year. With an array like this, it's likely that other vinyl chlorides are lurking in the background.

Allied Chemical Corp. and Dow Chemical Co., for example, recently reported to the Labor Department's Occupational Safety and Health Administration that they had found excess cancer mortality among workers at two plants that made pesticides with inorganic arsenic. One study, conducted by Johns Hopkins University's School of Hygiene and Public Health, found that of the 22 retired male workers from Allied's Baltimore pesticide plant who died between 1962 and 1972, 17 had died of cancer. At Dow's Midland, Mich., arsenical pesticide plant, which was closed down 20 years ago, Dow researchers found that of 173 workers who died between 1940 and 1972, 57 died of cancer. Both studies show higher-than-expected rates of cancer death.

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Based on previous, less-conclusive evidence linking arsenic with cancer, the National Institute for Occupational Safety and Health last January recommended reducing maximum levels of arsenic in the air of factories from the present 0.5 milligrams per cubic meter of air to 0.05 milligrams. Industry has opposed that reduction, but there is growing pressure on the Occupational Safety and Health Administration to impose a "no detectable" limit on arsenic.

Obviously, it isn't enough to learn that workers exposed decades before to vinyl chloride, arsenic and asbestos—to name a few carcinogens—are dying today of cancer or of other toxic effects of those substances. But the question of how to go about determining whether chemicals are indeed lethal in the long term is the subject of some dispute.

Suggested Solution

One suggested solution is to test all chemicals already in the workplace and to test other chemicals before they are used. However, Dr. Irving J. Selikoff, an expert on environmental carcinogens at Mount Sinai School of Medicine in New York, claims that this would be "unrealistic and scientifically impossible.

"Resources are limited," he says, "so we can't go charging off in all directions at once." Instead, Dr. Selikoff says that he and Dr. E. Cuyler Hammond, the chief health statistician of the American Cancer Society, have worked out some tentative testing guidelines. First, he says, chemicals to be tested should be those to which large numbers of workers are exposed. If many consumers are exposed to the chemical as well, he adds, the substance is an even likelier target for study.

An example of one such chemical is carbon black, an ingredient in rubber tires and, consequently, a widespread air pollutant. "We ought to be taking a look at what's happening to carbon-black workers," the doctor says. (Scientists currently know that massive doses of carbon black painted on the skin of mice has caused tumors.) Other prime study targets, he says, are substances whose chemical structure is "suspicious" (or not unlike the structures of known carcinogens).

The testing envisioned by Dr. Selikoff would be a combination of animal trials, in which hundreds of animals would be exposed for long periods to the chemicals being studied, and statistical surveys of working populations that have handled the chemicals. "There are agents to which millions of people have been exposed which now can be evaluated in terms of long-term human experience," he says. "The human data is there waiting for us to evaluate it." (Because animal studies don't always predict what will happen in humans exposed to the same substances, he says, the human monitoring is essential.)

A Complication

All this testing would be complicated by the possibility that some chemicals in the workplace cause cancer only in combination with other chemicals. And the exposure of most workers to many chemicals at the same time would make it difficult to pinpoint the offending chemical.

The cancer danger of vinyl chloride was spotted only because it caused an exceedingly rare tumor, liver angiosarcoma, of which there are only slightly more than 100 cases in medical literature. If vinyl chloride were to cause a more common malignancy, such as lung cancer, it wouldn't have been so readily detected as a carcinogen.

But testing is only one part of the problem, the other part being what do do about toxic substances once their dangers are exposed. There's some risk in almost every activity, meaning that "acceptable" risks have to be determined for various substances. For example, even sugar, if injected in sufficiently large does, will cause cancer in laboratory animals; yet no one is suggesting that sugar use be drastically curtailed among humans for that reason.

To arrive at a balance between risks and benefits, the risks must be fully understood. But very little is known about the dangers posed to workers by the thousands of substances they work with, and there is little optimism that such substances will be fully tested in the near future. Government agencies are understaffed and working with limited funds. A Toxic Substances Control Act, which the Labor Department says it needs to strengthen its hand in controlling industrial chemicals, is stuck in a House-Senate conference committee.

Of course, even if such an act were to be passed, even the most sanguine aren't suggesting that the workplaces of American industry will be cleared of danger. Nevertheless, it is becoming more and more evident that there is less willingness to accept chemical dangers as simply an inescapable part of working life.

"Whatever happens," editorializes Lancet, the British medical journal, "the vinyl-chloride episode will have provided a salutary lesson. It will not be quite so easy in the future as it has been in the past for any chemical manufacturer to assume, until proved otherwise, that a chemical to which workers are exposed is carcinogenically safe. There must surely be more systematic evaluation of industrially used chemicals for carcinogenic risk to workers."